

IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

IN RE NATIONAL	:	MDL No. 2804
PRESCRIPTION OPIATE	:	CASE NO. 17-MD-2804
LITIGATION	:	(DAP)
	:	

SECOND SUPPLEMENTAL EXPERT REPORT OF
CRAIG J. MCCANN, PH.D., CFA
April 15, 2019

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I. Qualifications and Remuneration

1. On March 25, 2019, I filed an Expert Report (the “McCann Report”) in this matter. My Qualifications and Remuneration are contained in the McCann Report §1 and are unchanged.

A. Materials Reviewed

2. The list of Materials Reviewed in preparing the McCann Report are contained in the McCann Report §2 and are unchanged except to add the following materials:

- a. Administrative Memorandum of Agreement (between DEA and Mallinckrodt);¹
- b. Second Amended Complaint, Cuyahoga County;
- c. Third Amended Complaint, Summit County;
- d. “chargeback” data identified in Appendix 2; and
- e. IQVIA/IMS data identified below.

B. Assignment

3. I documented how I processed, validated and augmented opioid transaction data produced by the Drug Enforcement Administration (“DEA”) and by the Defendants, focused entirely on Distributor transactions in the McCann Report.

4. I have been asked to file this report (the “Second Supplemental McCann Report”) addressing transactions originating with Manufacturer

¹ www.justice.gov/usao-edmi/press-release/file/986026/download

Defendants which ultimately led to opioid transactions with Dispensers in Cuyahoga County and Summit County.

5. I have now been asked by Counsel to document how I further processed and validated opioid transaction data produced by the DEA, to attribute transactions with Dispensers to Manufacturers in this Second Supplemental McCann Report.²

6. I have been asked to summarize transactions in the ARCOS Data, especially those transactions into Cuyahoga County and Summit County attributable to Manufacturer Defendants.

7. I have also been asked to report the results of applying certain algorithms to the ARCOS Data attributable to Manufacturer Defendants.

II. Summary of Opinions

8. I previously concluded that the ARCOS Data produced by the DEA reflecting opioid shipments from January 2006 through December 2014 is reliable. I further concluded that the transaction records produced in discovery by the Distributor Defendants other than AmerisourceBergen are a reliable source of transactions data before 2006 and after 2014 for the varied time periods covered by the Distributor Defendants' transactions productions.

9. In the next section, I explain how the ARCOS Data can be used to identify the Manufacturer for virtually all the transactions in the ARCOS Data. In Section IV and Section V, I report the results of attributing

² On April 3, 2019, I filed a brief supplemental report (the "McCann Supplemental Report") to insert some Figures and Tables which had been inadvertently excluded from the McCann Report.

transactions flagged by a non-exhaustive set of algorithms applied to the ARCOS Data in the McCann Report to Manufacturer Defendants.

III. Attributing Transactions With Dispensers to Manufacturers

A. ARCOS Data

1. NDC Labeler Field

10. Drug packages are uniquely identified in the ARCOS Data by a National Drug Code, or NDC. The NDC has three segments, the first of which identifies the drug product's Labeler which is typically but not always the drug's Manufacturer.³ For example, 00603-3882-28 identifies hydrocodone/acetaminophen tablets manufactured by Par Pharmaceutical.

11. There are 23,280 unique NDCs in the ARCOS Data and 1,991 unique NDCs in transactions with Dispensers in Cuyahoga County and Summit County. There were 1,462,630 opioid transactions to Dispensers in Cuyahoga County from 2006 to 2014 containing 465,121,322 dosage units and 8,553,177,070 MME.⁴ There were 823,049 opioid transactions to Dispensers in Summit County from 2006 to 2014 containing 275,807,920 dosage units and 5,158,182,360 MME.⁵

12. Each record for the 2,285,679 transactions to Dispensers in Cuyahoga County and Summit County from 2006 to 2014 includes an NDC code.⁶

³ "NDC Dictionary Instructions," Drug Enforcement Administration, October 2010. Current version available at <https://www.deadiversion.usdoj.gov/arcos/ndc/readme.txt>.

⁴ See McCann Report, §VIII.A, Table 16.

⁵ See McCann Report, §VIII.B, Table 20.

⁶ From this point forward, my analysis deals with twelve non-treatment opioids.

13. I list the entries in the Labeler field for transactions with Dispensers in Cuyahoga County and Summit County sorted by MME in Appendix 1. The top 20 Labelers by MME - accounting for 96.9% of the total MME shipped to Dispensers - in Cuyahoga County and Summit County are listed in Table 1.

Table 1 Top 20 Labelers, Cuyahoga County and Summit County, ARCOS Data, 2006-2014.

Rank	Labeler Name	MME	Perecent	Cumulative
1	SpecGx LLC	2,363,328,618	24.84%	24.84%
2	Actavis Pharma, Inc.	1,738,415,745	18.27%	43.11%
3	Purdue Pharma LP	1,243,413,759	13.07%	56.18%
4	Mylan Pharmaceuticals, Inc.	812,560,597	8.54%	64.71%
5	Par Pharmaceutical	801,417,396	8.42%	73.14%
6	Sandoz Inc	326,803,360	3.43%	76.57%
7	Teva Pharmaceuticals USA, Inc.	275,018,491	2.89%	79.46%
8	Janssen Pharmaceuticals, Inc.	261,918,787	2.75%	82.21%
9	Endo Pharmaceuticals, Inc.	256,614,381	2.70%	84.91%
10	Hospira, Inc.	218,988,687	2.30%	87.21%
11	West-Ward Pharmaceuticals Corp.	209,187,024	2.20%	89.41%
12	Rhodes Pharmaceuticals	135,748,211	1.43%	90.84%
13	Amneal Pharmaceuticals LLC	126,395,133	1.33%	92.17%
14	KVK-Tech, Inc.	114,646,567	1.20%	93.37%
15	Ethex Corporation	109,507,886	1.15%	94.52%
16	Baxter Healthcare Corporation	65,057,223	0.68%	95.21%
17	Apotex Corp.	60,850,950	0.64%	95.85%
18	Alpharma Pharmaceuticals LLC	36,899,587	0.39%	96.23%
19	Sun Pharmaceutical Industries, Inc.	32,290,942	0.34%	96.57%
20	Cephalon, Inc.	32,166,783	0.34%	96.91%

14. A Manufacturer Defendant may manufacture an NDC-coded drug package but a different firm may be the package's Labeler. The ARCOS Data allows us to more fully identify the Manufacturer of all NDC-coded drug packages shipped to a Dispenser in Cuyahoga County and Summit County by tracing the drug package upstream to the Manufacturer associated with that NDC as I explain next.

2. *Seller Business Activity*

15. Each transaction in the ARCOS Data includes a Seller Business Activity field and a Buyer Business Activity field. Possible values in these fields include “Manufacturer”. Manufacturers can have more than one DEA number and can show up in some transactions as the Buyer and in some transactions as the Seller.

16. A Distributor reporting an opioid sale to a Dispenser purchased that drug either from another Distributor or from a Manufacturer.⁷ Both the Distributor selling to the Dispenser and the Distributor or Manufacturer it bought the drug from report a prior transaction in that NDC. This prior transaction will almost always be for a larger quantity than the transaction to an individual Dispenser since Distributors sell to multiple Dispensers.

17. Shipments to Dispensers in the ARCOS Data can be traced upstream to Manufacturers. The flow of an opioid to the Dispenser may pass through more than one Distributor and through more than one Manufacturer but ultimately there will be a Manufacturer that began the downstream flow of opioids ending at the Dispenser. Based on the ARCOS data, more than 96.6% of the MME shipped to Dispensers in Cuyahoga County and Summit County travel down paths that originate upstream with a Manufacturer.⁸

⁷ Only 0.1% of the transactions, containing only 0.2% of the dosage units and MME, are from Manufacturers directly to Dispensers in Cuyahoga County and Summit County so my example starts with a sale from a Distributor to a Dispenser.

⁸ 98.2% of the MME shipped to Dispensers in Cuyahoga County and Summit County travel down paths that originate upstream with an ARCOS Manufacturer or a distributor owned by a Manufacturer Defendant.

B. Chargeback Data

18. I received “chargeback” data produced by some Manufacturer Defendants. The chargeback data identifies drug by NDC, the Dispenser, the quantity sold and the price received. The chargeback data I have received only partially covers sales of these Manufacturer Defendants’ opioids.

19. The chargeback data I received shows patterns of shipments of drugs from Manufacturers all the way through to Dispensers. Assuming the limited chargeback data provided to me is typical in nature and scope of that available to the Manufacturers, the Manufacturer Defendants could have monitored orders from Dispensers, primarily retail and chain pharmacies, if they received chargeback data for all sales of all opioids they shipped to other Manufacturers and to Distributors.

C. IQVIA/IMS Data

20. The IQVIA/IMS Data I received from Counsel includes some patient information and detailed information including name and physical address of the prescribing physician. Assuming the IQVIA/IMS Data provided to me is typical in nature and scope to that which was available to Manufacturers, a Manufacturer Defendant could have known where some or all of its drugs were being prescribed.

D. Combining NDC, ARCOS Business Activity and Chargeback Data to Attribute Transactions with Dispensers to Manufacturers

21. I am able to identify those NDC for which a Manufacturer Defendant was the Labeler, was the Manufacturer or included the NDC code in its chargeback data for 78.1% of the opioid MME shipped to Dispensers in

Cuyahoga County and in Summit County as reflected in the ARCOS Data produced by the DEA for the period 2006-2014 as follows.

22. I first identify those NDCs that have a Manufacturer Defendant or a Manufacturer Defendant subsidiary as the Labeler.⁹ 73.4% of the opioid MME shipped to Dispensers in Cuyahoga County and Summit County involve NDCs for which a Manufacturer Defendant is the Labeler.

23. Next, I trace back through the transactions from Distributors to Dispensers in the ARCOS Data to the first reported transaction which could plausibly have led to the Distributor's sale to a Dispenser. To make matters concrete, consider the series of ARCOS reported transactions listed in Figure 1. NDC #591350401 identifies 100-tablet bottles of generic 80 mg OxyContin manufactured by Purdue and labeled by Watson.

Figure 1 Example ARCOS Transactions Leading to Ohio Pharmacy

TRANSACTION_DATE	REPORTER_DEA_NO	Reporter_family	REPORTER_BUS_ACT	REPORTER_STATE	BUYER_DEA_NO	BUYER_BUS_ACT	BUYER_CITY	BUYER_COUNTY	BUYER_STATE	DRUG_CODE	NDC_NO	TRANSACTION_CODE	DOSAGE_UNIT	MME	dos_str
11/30/2006	RP0257938	Purdue Pharmaceuticals LP	MANUFACTURER	NC	RS0104517	DISTRIBUTOR	BREWSTER	PUTNAM	NY	9143	591350401	S	543,000	58,415,940	80
12/19/2006	RS0104517	Watson Pharma Inc	DISTRIBUTOR	NY	RA0314562	DISTRIBUTOR	LOCKBOURNE	FRANKLIN	OH	9143	591350401	S	28,800	3,098,304	80
1/5/2007	RA0314562	AmerisourceBergen Drug	DISTRIBUTOR	OH	AK2946854	RETAIL PHARMACY	CUYAHOGA FALLS	SUMMIT	OH	9143	591350401	S	200	21,516	80

⁹ <https://www.fda.gov/Drugs/DevelopmentApprovalProcess/UCM070829> According to FDA's website, FDA assigns the Labeler code, and the product and package codes of the NDC are assigned by the Labeler.

- On November 30, 2006, a Purdue manufacturing facility in North Carolina shipped 5,430 bottles containing 543,000 oxycodone 80 mg tablets to a Watson distribution facility in Brewster, NY.¹⁰
- On December 19, 2006, the Watson facility shipped 288 bottles containing 28,800 oxycodone 80 mg tablets to an AmerisourceBergen distribution center in Lockbourne, OH.¹¹
- On January 5, 2007, the AmerisourceBergen distribution center shipped 2 bottles containing 200 oxycodone 80 mg tablets to a pharmacy in Cuyahoga Falls, OH.¹²

24. 89.9% of the MME in transactions to Dispensers in Cuyahoga County and Summit County can be traced back to a Manufacturer that originated at least 95% of the MME in that NDC nationally. That is, independent of the Labeler information in the NDC code, the Manufacturer provenance of less than 10% of the MME in transactions in Cuyahoga County and Summit County is uncertain as a result of tracing the flow of opioids in the ARCOS Data. 61.1% of the MME in transactions to Dispensers in

¹⁰ The same day, Purdue had four shipments to the Watson distribution center in Brewster, NY totaling 2,169,100 tablets of these 100-tablet packages of generic 80 mg OxyContin tablets. There were regular, similar-sized shipments from Purdue's NC manufacturing facility to Watson's Brewster, NY distribution center. In 2006 alone, the shipments of generic 80 mg OxyContin between these facilities totaled 33,546,300 tablets.

¹¹ The same month, Watson had three shipments to the AmerisourceBergen distribution center in Franklin, OH totaling 100,800 tablets of these 100-tablet packages of generic 80 mg OxyContin tablets. In 2006, the shipments of generic 80 mg OxyContin from Watson's Brewster, NY facility to AmerisourceBergen's distribution center totaled 626,400 tablets.

¹² In 2006, AmerisourceBergen shipped 21,200 generic 80 mg OxyContin tablets from its Franklin, OH distribution center to this pharmacy.

Cuyahoga County and Summit County can be traced to a Manufacturer Defendant.

25. There are some instances, as in Figure 1 above, where the Manufacturer and the Labeler are different but both are Manufacturer Defendants. In other cases, either the Manufacturer or the Labeler – but not both – are Manufacturer Defendants.

IV. Manufacturer Attribution of Flagged Transactions

A. Maximum Monthly, Trailing Six-Month Threshold

26. As described in McCann Report, §IX.A 1,271,618 transactions in Cuyahoga County were flagged using the Maximum Monthly, Trailing Six-Month Threshold. The Trailing Six-Month Maximum Threshold methodology flagged 76.0% of transactions accounting for 89.6% of dosage units, 73.5% of MME and 83.2% of drug weight shipped into Cuyahoga County. McCann Report, ¶ 133.

27. Table 2 reports the result of attributing the flagged transactions in Cuyahoga County to Manufacturer Defendants that were either the Labeler, the Manufacturer or had included the NDC in its chargeback data. This analysis could be extended to earlier and later time periods with additional ARCOS data or using Defendant transaction data before 2006 or after 2014.

Table 2 Trailing Six-Month Maximum Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	79,194	124,896	13,103	2	49	2,004	219,248	83.2%
Allergan	76,887	124,119	12,387	2	49	1,999	215,443	83.4%
Cephalon	n/a	n/a	n/a	n/a	n/a	1,312	1,312	42.4%
Endo	25,201	310	2,752	n/a	3,810	n/a	32,073	68.6%
Janssen	80	n/a	n/a	n/a	n/a	3,751	3,831	12.9%
Mallinckrodt	94,772	128,652	9,134	5,527	1	4,774	242,860	87.0%
Par	35,170	68,780	2,866	0	18	9,247	116,081	85.3%
Purdue	73,883	n/a	14,466	440	n/a	n/a	88,789	90.2%
Qualitest	36,543	65,202	3,442	86	18	8,814	114,105	88.3%
Teva	86,427	131,186	8,793	2	1,110	24,361	251,879	82.3%

28. As described in McCann Report, §IX.A 811,825 transactions in Summit County were flagged using the Maximum Monthly, Trailing Six-Month Threshold. The Trailing Six-Month Maximum Threshold methodology flags 75.4% of transactions accounting for 88.5% of dosage units, 71.4% of MME and 83.1% of drug weight shipped into Summit County. McCann Report, ¶ 134.

29. Table 3 reports the result of attributing the flagged transactions in Summit County to Manufacturer Defendants that were either the Labeler, the Manufacturer or included the NDC in its chargeback data.

Table 3 Trailing Six-Month Maximum Threshold Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	41,460	75,546	10,564	8	444	2,384	130,406	84.7%
Allergan	40,665	75,304	9,881	6	444	2,520	128,820	84.9%
Cephalon	n/a	n/a	n/a	n/a	n/a	496	496	30.5%
Endo	21,085	209	5,436	n/a	5,884	n/a	32,614	73.7%
Janssen	268	n/a	n/a	n/a	n/a	2,944	3,212	15.0%
Mallinckrodt	65,656	73,852	11,121	9,804	31	3,847	164,311	84.9%
Par	28,132	44,830	5,638	0	177	2,944	81,721	86.1%
Purdue	38,567	n/a	10,973	710	n/a	n/a	50,250	91.3%
Qualitest	29,806	42,280	6,906	307	177	2,524	82,000	88.5%
Teva	46,806	78,583	6,020	7	3,268	8,927	143,611	83.1%

B. Twice Trailing Twelve-Month Average Pharmacy Dosage Units¹³

30. As described in McCann Report, §IX.B 763,723 transactions in Cuyahoga County were flagged using the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold.

31. The Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold methodology flags 45.6% of transactions accounting for 54.9% of dosage units, 57.1% of MME and 59.0% of drug weight shipped into Cuyahoga County. McCann Report, ¶ 137.

¹³ In the McCann Report, I reported the result of comparing transactions with Dispensers to two times, and three times, transactions with similar pharmacies nationally. I do not apply those approaches in this supplement, in part, because of the additional complexity of identifying the Manufacturer for every NDC code throughout the Country as opposed to just in Cuyahoga County and Summit County.

32. Table 4 reports the result of attributing the flagged transactions in Cuyahoga County to Manufacturer Defendants that were either the Labeler, the Manufacturer or included the NDC in its chargeback data.

Table 4 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	39,389	55,010	10,693	0	78	11,654	116,824	44.3%
Allergan	38,087	54,709	10,135	0	78	11,719	114,728	44.4%
Cephalon	n/a	n/a	n/a	n/a	n/a	2,708	2,708	87.5%
Endo	11,094	101	2,325	n/a	6,220	n/a	19,740	42.2%
Janssen	59	n/a	n/a	n/a	n/a	14,058	14,117	47.4%
Mallinckrodt	45,983	59,378	7,330	7,632	1	5,339	125,663	45.0%
Par	17,257	22,404	2,409	0	50	9,607	51,727	38.0%
Purdue	43,700	n/a	11,262	329	n/a	n/a	55,291	56.2%
Qualitest	18,019	20,964	2,747	115	50	7,103	48,998	37.9%
Teva	43,887	57,178	6,933	0	1,457	33,463	142,918	46.7%

33. As described in McCann Report, §IX.B 676,478 transactions in Summit County were flagged using the Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold.

34. The Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold methodology flags 62.9% of transactions accounting for 72.5% of dosage units, 74.4% of MME and 72.3% of drug weight shipped to Summit County. McCann Report, ¶ 138.

35. Table 5 reports the result of attributing the flagged transactions in Summit County to Manufacturer Defendants that were either the Labeler, the Manufacturer or included the NDC in its chargeback data.

Table 5 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold
Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	24,679	60,452	10,452	10	512	8,090	104,195	67.7%
Allergan	24,256	60,297	9,813	6	512	8,249	103,133	67.9%
Cephalon	n/a	n/a	n/a	n/a	n/a	1,400	1,400	86.1%
Endo	12,863	232	5,473	n/a	8,630	n/a	27,198	61.4%
Janssen	172	n/a	n/a	n/a	n/a	13,832	14,004	65.3%
Mallinckrodt	39,485	55,049	10,510	11,228	37	5,375	121,684	62.9%
Par	18,996	29,983	5,692	12	206	3,644	58,533	61.7%
Purdue	25,509	n/a	10,911	811	n/a	n/a	37,231	67.6%
Qualitest	20,260	28,167	6,871	330	206	1,496	57,330	61.9%
Teva	27,921	62,468	5,920	7	3,821	15,252	115,389	66.7%

C. Three Times Trailing Twelve-Month Average Pharmacy Dosage Units

36. As described in McCann Report, §IX.C 434,698 transactions in Cuyahoga County were flagged using the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold. The Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold methodology flags 26.0% of transactions accounting for 32.3% of dosage units, 33.5% of MME and 34.8% of drug weight shipped into Cuyahoga County. McCann Report, ¶ 141.

37. Table 6 reports the result of attributing the flagged transactions in Cuyahoga County to Manufacturer Defendants that were either the Labeler, the Manufacturer or included the NDC code in its chargeback data.

Table 6 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold
Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-
2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	10,611	33,290	6,610	0	48	6,491	57,050	21.7%
Allergan	10,223	33,083	6,241	0	48	6,579	56,174	21.8%
Cephalon	n/a	n/a	n/a	n/a	n/a	2,305	2,305	74.5%
Endo	5,271	71	1,483	n/a	4,017	n/a	10,842	23.2%
Janssen	44	n/a	n/a	n/a	n/a	8,284	8,328	28.0%
Mallinckrodt	23,058	36,977	4,024	4,847	1	4,304	73,211	26.2%
Par	8,620	13,935	1,542	0	17	4,983	29,097	21.4%
Purdue	19,420	n/a	6,802	159	n/a	n/a	26,381	26.8%
Qualitest	9,511	13,106	1,775	75	17	3,795	28,279	21.9%
Teva	12,186	34,108	4,141	0	1,182	19,592	71,209	23.3%

38. As described in McCann Report, §IX.C 436,234 transactions in Summit County were flagged using the Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold. The Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold methodology flags 40.5% of transactions accounting for 50.0% of dosage units, 53.3% of MME and 51.4% of drug weight shipped into Summit County. McCann Report, ¶ 142.

39. Table 7 reports the result of attributing the flagged transactions in Summit County to Manufacturer Defendants that were either the Labeler, the Manufacturer or included the NDC code in its chargeback data.

Table 7 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold
Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	11,170	38,201	7,673	4	441	5,354	62,843	40.8%
Allergan	11,079	38,092	7,129	0	441	5,531	62,272	41.0%
Cephalon	n/a	n/a	n/a	n/a	n/a	1,109	1,109	68.2%
Endo	9,184	206	3,863	n/a	5,999	n/a	19,252	43.5%
Janssen	147	n/a	n/a	n/a	n/a	9,336	9,483	44.2%
Mallinckrodt	23,741	40,744	7,434	8,319	31	3,860	84,129	43.5%
Par	12,522	17,718	4,036	9	164	2,374	36,823	38.8%
Purdue	14,599	n/a	8,097	733	n/a	n/a	23,429	42.6%
Qualitest	13,262	16,565	4,846	255	164	590	35,682	38.5%
Teva	12,739	39,119	4,273	1	3,180	9,712	69,024	39.9%

D. Maximum 8,000 Dosage Units Monthly

40. As described in McCann Report, §IX.D 713,969 transactions in Cuyahoga County were flagged using the Maximum 8,000 Dosage Units Monthly Threshold. The Maximum 8,000 Dosage Units Monthly Threshold methodology flags 42.6% of transactions accounting for 61.4% of dosage units, 50.2% of MME and 49.9% of drug weight shipped into Cuyahoga County. McCann Report, ¶ 145.

41. Table 8 reports the result of attributing the flagged transactions in Cuyahoga County to Manufacturer Defendants that were either the Labeler, the Manufacturer or had included the NDC in its chargeback data.

Table 8 Maximum 8,000 Dosage Units Monthly Threshold Flagged Transactions
Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	67,162	79,700	2	0	0	6	146,870	55.7%
Allergan	65,639	79,293	2	0	0	7	144,941	56.1%
Cephalon	n/a	n/a	n/a	n/a	n/a	0	0	0.0%
Endo	13,585	14	0	n/a	0	n/a	13,599	29.1%
Janssen	43	n/a	n/a	n/a	n/a	78	121	0.4%
Mallinckrodt	58,474	75,411	410	0	0	626	134,921	48.3%
Par	23,193	44,274	0	0	0	1	67,468	49.6%
Purdue	58,632	n/a	42	0	n/a	n/a	58,674	59.6%
Qualitest	24,424	42,215	0	0	0	1	66,640	51.6%
Teva	72,275	83,596	2	0	0	52	155,925	51.0%

42. As described in McCann Report, §IX.D 563,914 transactions in Summit County were flagged using the Maximum 8,000 Dosage Units Monthly Threshold. The Maximum 8,000 Dosage Units Monthly Threshold methodology flags 52.4% of transactions accounting for 76.0% of dosage units, 54.7% of MME and 62.7% of drug weight shipped into Summit County. McCann Report, ¶ 146.

43. Table 9 reports the result of attributing the flagged transactions in Summit County to Manufacturer Defendants that were either the Labeler, the Manufacturer or had included the NDC in its chargeback data.

Table 9 Maximum 8,000 Dosage Units Monthly Threshold Flagged Transactions
Attributed to Manufacturer Defendants, Summit County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	38,904	66,279	2,142	0	325	2	107,652	69.9%
Allergan	38,332	66,088	1,887	0	325	0	106,632	70.3%
Cephalon	n/a	n/a	n/a	n/a	n/a	0	0	0.0%
Endo	15,645	163	757	n/a	2,305	n/a	18,870	42.6%
Janssen	172	n/a	n/a	n/a	n/a	59	231	1.1%
Mallinckrodt	50,580	61,725	2,323	1,720	0	134	116,482	60.2%
Par	23,183	39,797	790	9	67	1	63,847	67.3%
Purdue	34,374	n/a	1,220	279	n/a	n/a	35,873	65.2%
Qualitest	25,057	37,563	781	53	67	1	63,522	68.5%
Teva	42,912	69,113	528	0	1,647	8	114,208	66.1%

E. Maximum Daily Dosage Units

44. As described in McCann Report, §IX.E 1,225,867 transactions in Cuyahoga County were flagged using the Maximum Daily Dosage Units Threshold. The Maximum Daily Dosage Units Threshold methodology flags 83.3% of transactions accounting for 92.0% of dosage units, 91.1% of MME and 84.8% of drug weight shipped into Cuyahoga County. McCann Report, ¶ 149.

45. Table 10 reports the result of attributing the flagged transactions in Cuyahoga County to Manufacturer Defendants that were either the Labeler, the Manufacturer or had included the NDC in its chargeback data.

Table 10 Maximum Daily Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	80,916	124,277	14,248	3	n/a	218	219,662	91.5%
Allergan	78,786	123,488	13,485	0	n/a	190	215,949	92.0%
Cephalon	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Endo	22,469	274	3,019	n/a	n/a	n/a	25,762	73.9%
Janssen	77	n/a	n/a	n/a	n/a	656	733	34.3%
Mallinckrodt	89,734	134,177	10,815	6,399	n/a	3,500	244,625	88.7%
Par	33,385	72,902	3,122	0	n/a	4,829	114,238	87.7%
Purdue	72,112	n/a	15,789	484	n/a	n/a	88,385	89.8%
Qualitest	35,498	69,300	3,885	104	n/a	4,818	113,605	88.1%
Teva	87,776	130,690	9,630	0	n/a	12,054	240,150	87.2%

46. As described in McCann Report, §IX.E 804,324 transactions in Summit County were flagged using the Maximum Daily Dosage Units Threshold. The Maximum Daily Dosage Units Threshold methodology flags 86.8% of transactions accounting for 94.4% of dosage units, 94.0% of MME and 89.6% of drug weight shipped into Summit County. McCann Report, ¶ 150.

47. Table 11 reports the result of attributing the flagged transactions in Summit County to Manufacturer Defendants who were either the Labeler, the Manufacturer or had included the NDC in its chargeback data.

Table 11 Maximum Daily Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	43,530	76,904	11,655	11	n/a	78	132,178	93.8%
Allergan	42,722	76,661	10,867	7	n/a	38	130,295	94.1%
Cephalon	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Endo	19,805	245	5,714	n/a	n/a	n/a	25,764	82.6%
Janssen	268	n/a	n/a	n/a	n/a	250	518	49.9%
Mallinckrodt	64,194	81,170	12,656	10,960	n/a	1,711	170,691	90.5%
Par	27,406	48,037	5,944	12	n/a	688	82,087	90.2%
Purdue	39,690	n/a	11,577	806	n/a	n/a	52,073	94.6%
Qualitest	29,603	45,395	7,285	336	n/a	673	83,292	90.2%
Teva	48,729	79,959	6,406	8	n/a	2,604	137,706	90.1%

V. Flagging Transactions Attributable to Manufacturer Defendants

48. In the previous section, I attributed transactions with Dispensers in Cuyahoga County and Summit County to Manufacturer Defendants and categorized transactions attributed to Manufacturer Defendants according to whether they were flagged or not flagged in the McCann Report.

49. An alternative approach applies the five flagging methods in the McCann Report to each Distributor-to-Dispenser transaction attributable to each Manufacturer Defendant.

A. Maximum Monthly, Trailing Six-Month Threshold

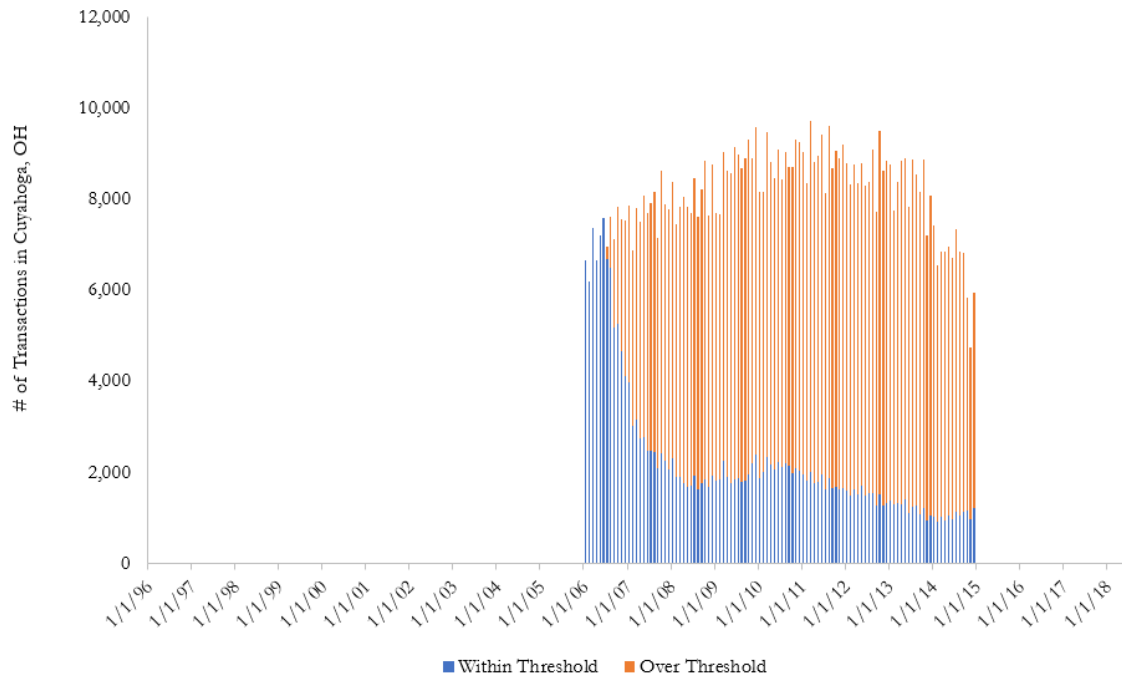
50. Under the first approach, I identify transactions that cause the number of dosage units to a Pharmacy in a calendar month attributable to a Manufacturer Defendant to exceed the highest number of dosage units to the same Pharmacy attributable to the same Manufacturer Defendant in any one of the six preceding calendar months. For example, if the number of dosage

units containing hydrocodone attributable to a Manufacturer Defendant to a Pharmacy in February, March, April, May, June, and July were 5,000; 10,000; 7,000; 8,000; 9,000; and 9,500 respectively, a transaction in August would be flagged if it caused the number of dosage units containing hydrocodone to the Pharmacy attributable to the same Manufacturer Defendant to exceed 10,000. Any reported transactions containing hydrocodone on that date and all reported transactions containing hydrocodone attributable to the Manufacturer Defendant to that Pharmacy thereafter are flagged.

51. In this approach, and the others implemented below, I have been asked by Counsel to assume that the Manufacturer Defendant could have developed intelligence on shipments of its drugs to Dispensers in Cuyahoga County and Summit County allowing it to flag suspect transactions. I have also been asked by Counsel to assume that the Manufacturer Defendant did not effectively investigate the flagged transactions and so every subsequent transaction of that drug code is also flagged because the Manufacturer Defendant had an unfulfilled obligation to detect and investigate the first flagged transaction.

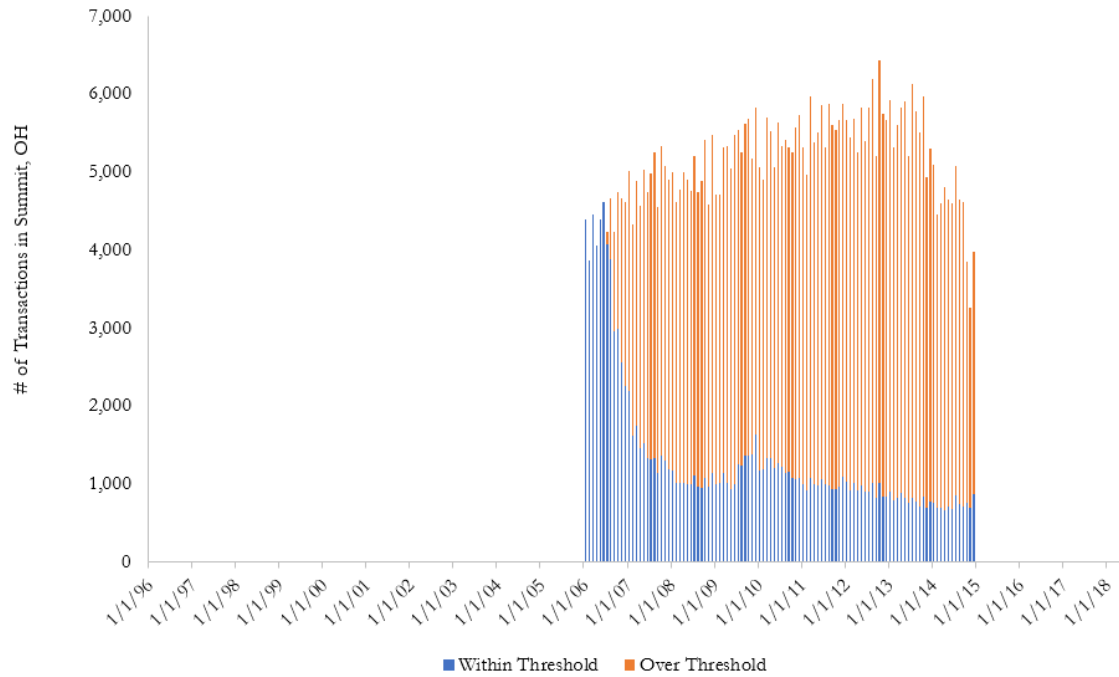
52. Figure 2 illustrates total opioid transactions to retail and chain pharmacies in Cuyahoga County from 2006 to 2014 attributable to Manufacturer Defendants. The Trailing Six-Month Maximum Threshold methodology flags 72.2% of transactions accounting for 85.2% of dosage units, 72.1% of MME and 77.0% of drug weight shipped into Cuyahoga County.

Figure 2 Trailing Six-Month Maximum Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014



53. Figure 3 illustrates total opioid transactions to retail and chain pharmacies in Summit County from 2006 to 2014 attributable to Manufacturer Defendants. The Trailing Six-Month Maximum Threshold methodology flags 74.0% of transactions accounting for 86.1% of dosage units, 71.7% of MME and 78.1% of drug weight shipped into Summit County.

Figure 3 Trailing Six-Month Maximum Threshold Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014



54. Table 12 and Table 13 summarize the transactions flagged based on the Trailing Six-Month Maximum Threshold Approach in Cuyahoga and Summit Counties.

Table 12 Trailing Six-Month Maximum Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	75,161	116,568	8,494	0	0	26	200,249	75.0%
Allergan	72,683	116,008	7,504	0	0	26	196,221	75.0%
Cephalon	n/a	n/a	n/a	n/a	n/a	1,183	1,183	38.2%
Endo	14,926	0	725	n/a	3,869	n/a	19,520	41.7%
Janssen	0	n/a	n/a	n/a	n/a	1,998	1,998	6.7%
Mallinckrodt	87,423	120,067	5,910	5,966	0	3,725	223,091	79.1%
Par	26,132	62,350	744	0	0	7,698	96,924	68.0%
Purdue	59,692	n/a	7,866	251	n/a	n/a	67,809	68.9%
Qualitest	30,685	61,257	940	0	0	7,464	100,346	73.9%
Teva	80,507	121,999	4,097	0	465	22,429	229,497	74.0%

Table 13 Trailing Six-Month Maximum Threshold Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	39,403	69,961	7,044	0	277	415	117,100	75.7%
Allergan	38,625	69,810	6,533	0	277	315	115,560	75.7%
Cephalon	n/a	n/a	n/a	n/a	n/a	353	353	21.7%
Endo	15,982	0	2,958	n/a	5,077	n/a	24,017	54.2%
Janssen	0	n/a	n/a	n/a	n/a	1,636	1,636	7.6%
Mallinckrodt	62,728	74,529	8,317	9,839	0	2,718	158,131	81.0%
Par	23,713	41,604	3,067	0	0	2,300	70,684	73.0%
Purdue	32,703	n/a	8,140	324	n/a	n/a	41,167	74.8%
Qualitest	27,130	40,144	3,442	101	0	2,187	73,004	77.3%
Teva	42,816	72,714	3,660	0	1,903	8,032	129,125	74.3%

B. Twice Trailing Twelve-Month Average Pharmacy Dosage Units

55. Figure 4 illustrates total opioid transactions to retail and chain pharmacies in Cuyahoga County from 2006 to 2014 attributable to Manufacturer Defendants. The Twice Trailing Twelve-Month Average Pharmacy Threshold methodology flags 9.0% of transactions accounting for 12.5% of dosage units, 11.0% of MME and 11.4% of drug weight shipped into Cuyahoga County.

56. Figure 5 illustrates total opioid transactions to retail and chain pharmacies in Summit County from 2006 to 2014 attributable to Manufacturer Defendants. The Twice Trailing Twelve-Month Average Pharmacy Threshold methodology flags 11.1% of transactions accounting for 13.9% of dosage units, 11.5% of MME and 12.3% of drug weight shipped into Summit County.

Figure 4 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

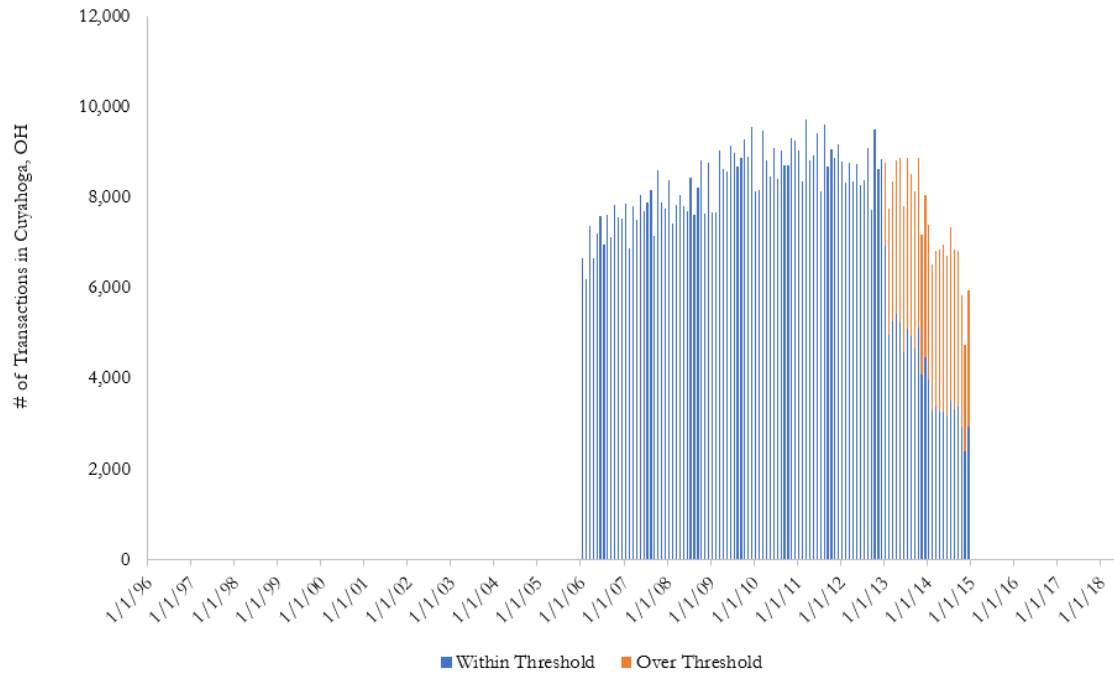
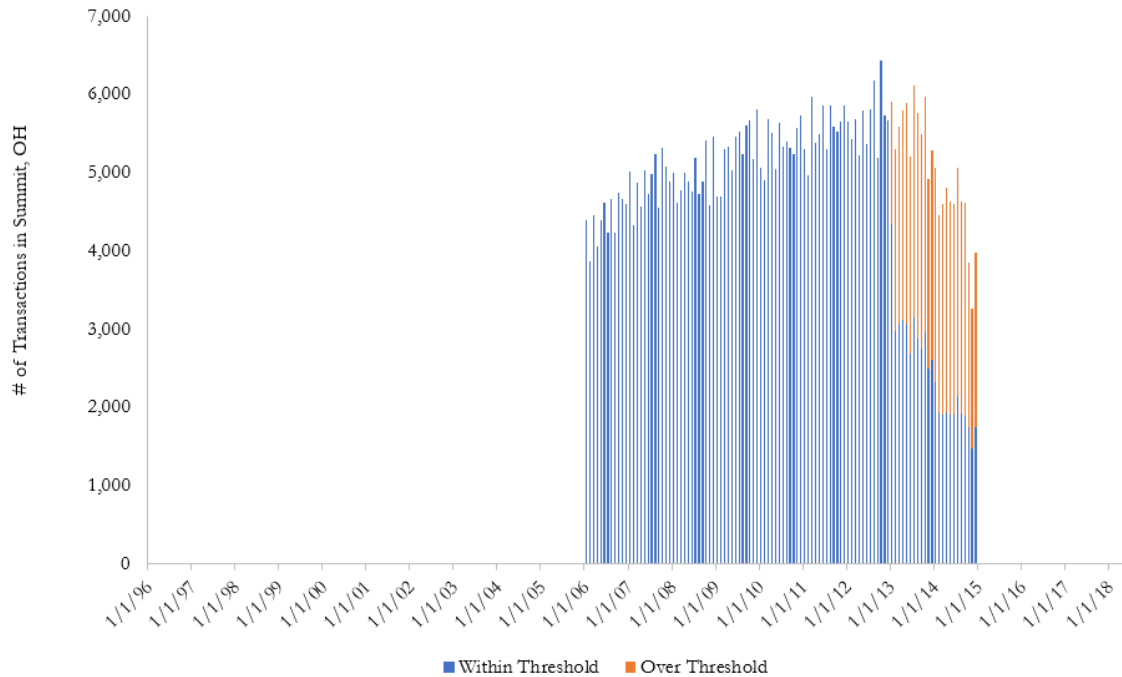


Figure 5 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014



57. Table 14 and Table 15 summarize the transactions flagged based on the Twice Trailing Twelve-Month Average Pharmacy Threshold methodology in Cuyahoga and Summit Counties.

Table 14 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	14,738	9,955	0	0	0	880	25,573	9.6%
Allergan	14,884	8,526	0	0	0	115	23,525	9.0%
Cephalon	n/a	n/a	n/a	n/a	n/a	137	137	4.4%
Endo	385	0	72	n/a	413	n/a	870	1.9%
Janssen	0	n/a	n/a	n/a	n/a	19	19	0.1%
Mallinckrodt	10,146	2,658	1,952	726	0	90	15,572	5.5%
Par	7,224	15,126	72	0	0	3,362	25,784	18.1%
Purdue	5,976	n/a	2,142	64	n/a	n/a	8,182	8.3%
Qualitest	8,734	14,989	87	31	0	3,261	27,102	20.0%
Teva	14,708	10,717	0	0	0	1,274	26,699	8.6%

Table 15 Twice Trailing Twelve-Month Average Pharmacy Dosage Units Threshold
Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	8,027	7,497	252	0	0	960	16,736	10.8%
Allergan	8,125	7,124	191	0	0	252	15,692	10.3%
Cephalon	n/a	n/a	n/a	n/a	n/a	0	0	0.0%
Endo	1,099	0	130	n/a	1,744	n/a	2,973	6.7%
Janssen	0	n/a	n/a	n/a	n/a	94	94	0.4%
Mallinckrodt	7,554	5,171	2,885	1,763	0	9	17,382	8.9%
Par	4,578	13,151	153	0	0	1,133	19,015	19.6%
Purdue	1,689	n/a	2,812	0	n/a	n/a	4,501	8.2%
Qualitest	5,897	12,895	198	86	0	799	19,875	21.0%
Teva	8,050	7,791	114	0	0	465	16,420	9.4%

C. Three Times Trailing Twelve-Month Average Pharmacy Dosage Units

58. Figure 6 illustrates total opioid transactions to retail and chain pharmacies in Cuyahoga County from 2006 to 2014 attributable to Manufacturer Defendants. The Three Times Trailing Twelve-Month Average Pharmacy Threshold methodology flags 5.7% of transactions accounting for 9.2% of dosage units, 8.2% of MME and 8.4% of drug weight shipped into Cuyahoga County.

59. Figure 7 illustrates total opioid transactions to retail and chain pharmacies in Summit County from 2006 to 2014 attributable to Manufacturer Defendants. The Three Times Trailing Twelve-Month Average Pharmacy Threshold methodology flags 7.8% of transactions accounting for 10.8% of dosage units, 9.4% of MME and 9.9% of drug weight shipped into Summit County.

Figure 6 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

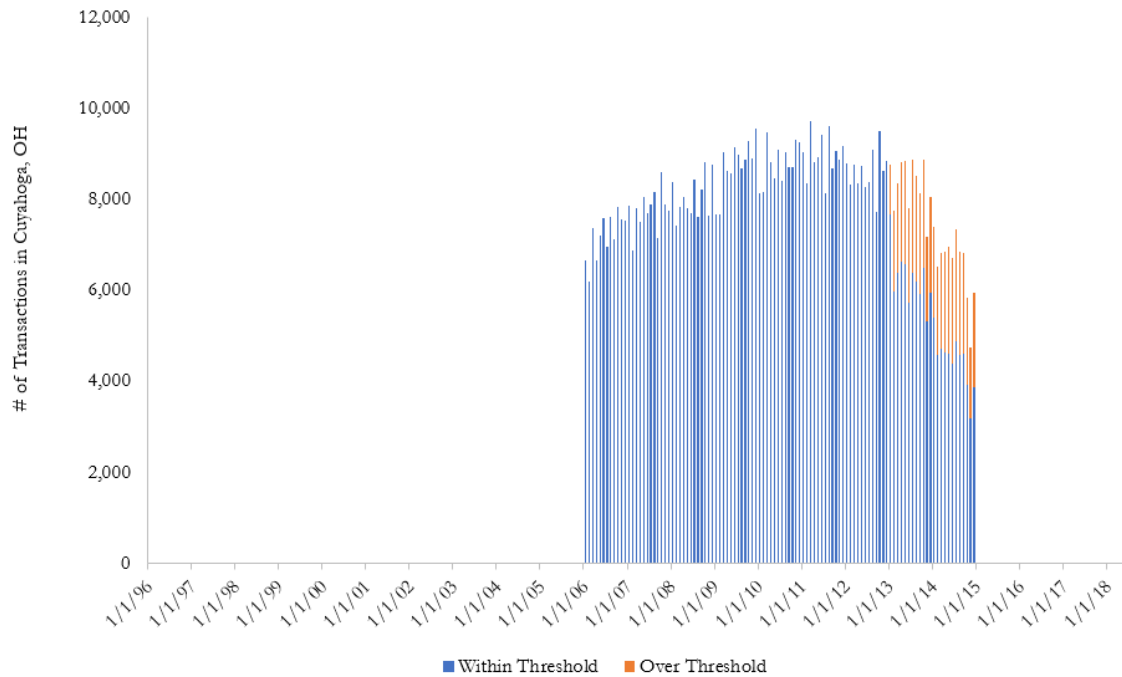
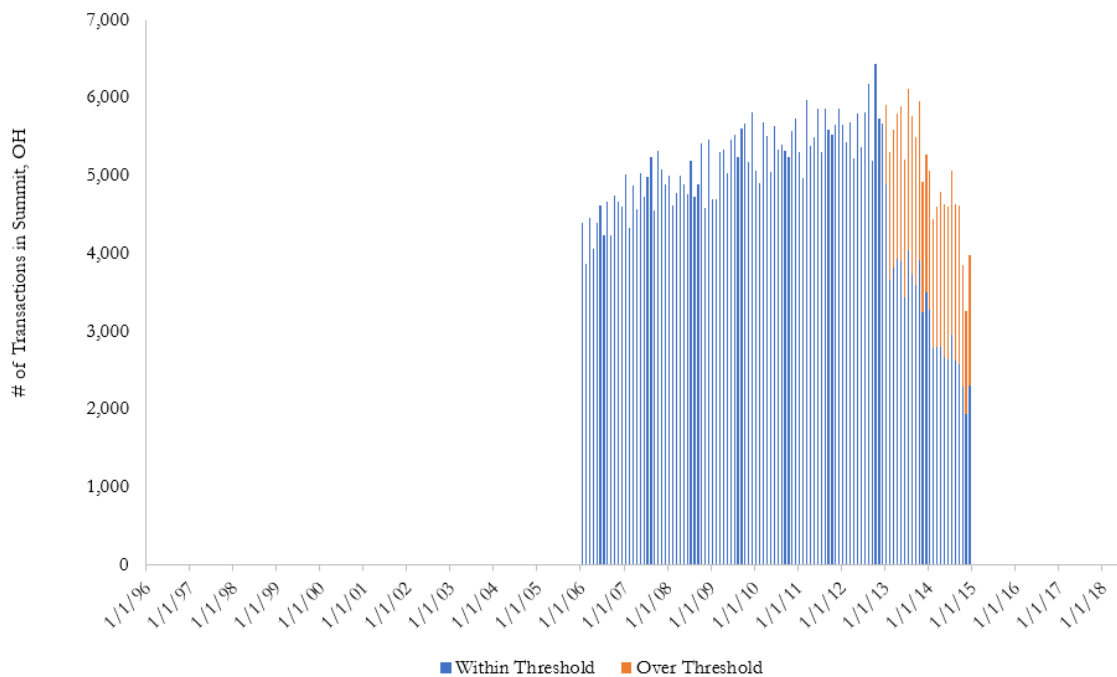


Figure 7 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014



60. Table 16 and Table 17 summarize the transactions flagged based on the Three Times Trailing Twelve-Month Average Pharmacy Threshold methodology in Cuyahoga and Summit Counties.

Table 16 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	13,090	5,379	0	0	0	456	18,925	7.1%
Allergan	13,268	4,889	0	0	0	28	18,185	6.9%
Cephalon	n/a	n/a	n/a	n/a	n/a	133	133	4.3%
Endo	191	0	21	n/a	300	n/a	512	1.1%
Janssen	0	n/a	n/a	n/a	n/a	0	0	0.0%
Mallinckrodt	6,758	1,063	1,147	82	0	1	9,051	3.2%
Par	5,978	6,860	21	0	0	3,291	16,150	11.3%
Purdue	3,072	n/a	1,266	0	n/a	n/a	4,338	4.4%
Qualitest	6,899	6,798	26	17	0	1,726	15,466	11.4%
Teva	13,091	5,483	0	0	0	262	18,836	6.1%

Table 17 Three Times Trailing Twelve-Month Average Pharmacy Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014

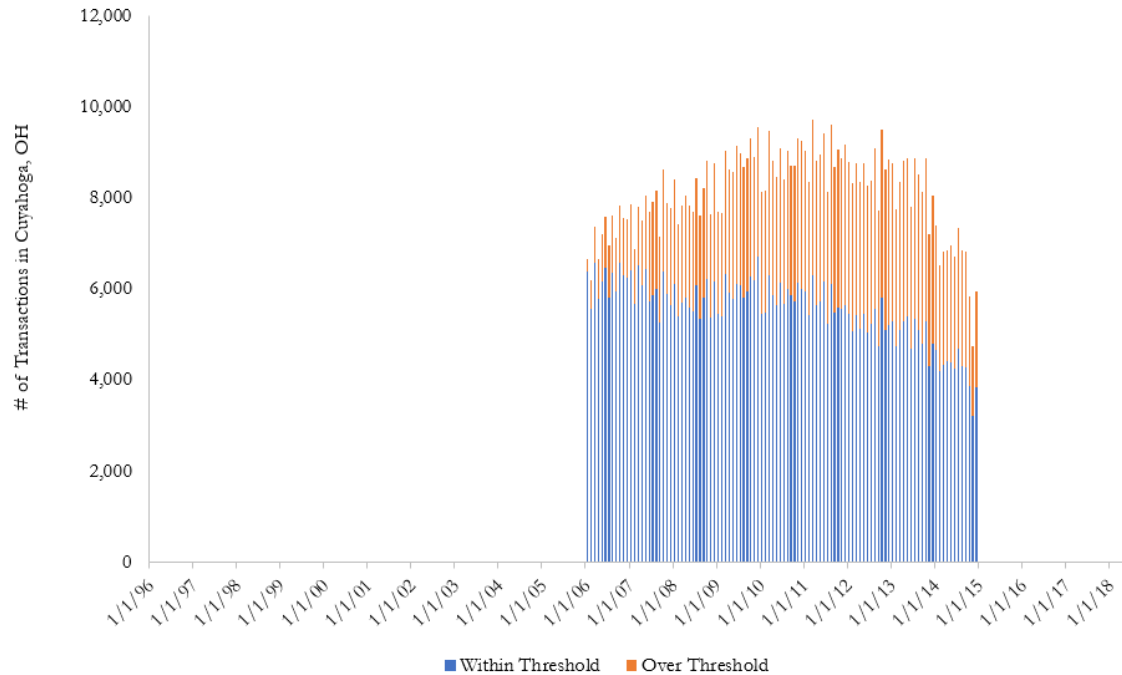
# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	7,009	5,192	148	0	0	665	13,014	8.4%
Allergan	7,309	5,185	120	0	0	0	12,614	8.3%
Cephalon	n/a	n/a	n/a	n/a	n/a	0	0	0.0%
Endo	771	0	62	n/a	1,351	n/a	2,184	4.9%
Janssen	0	n/a	n/a	n/a	n/a	0	0	0.0%
Mallinckrodt	6,221	861	1,991	1,325	0	0	10,398	5.3%
Par	3,864	8,846	62	0	0	926	13,698	14.2%
Purdue	1,115	n/a	1,996	0	n/a	n/a	3,111	5.7%
Qualitest	4,691	8,716	64	63	0	243	13,777	14.6%
Teva	7,016	5,467	78	0	0	28	12,589	7.2%

D. Maximum 8,000 Dosage Units Monthly

61. I identify transactions that cause the number of dosage units to a Pharmacy in a calendar month attributable to Manufacturer Defendant to exceed 8,000 dosage units. As stated above, I have been asked by Counsel to assume that the Manufacturer did not effectively investigate the flagged transactions and so every subsequent transaction of that drug code is also flagged because the Manufacturer had an unfulfilled obligation to detect and investigate the first flagged transaction.

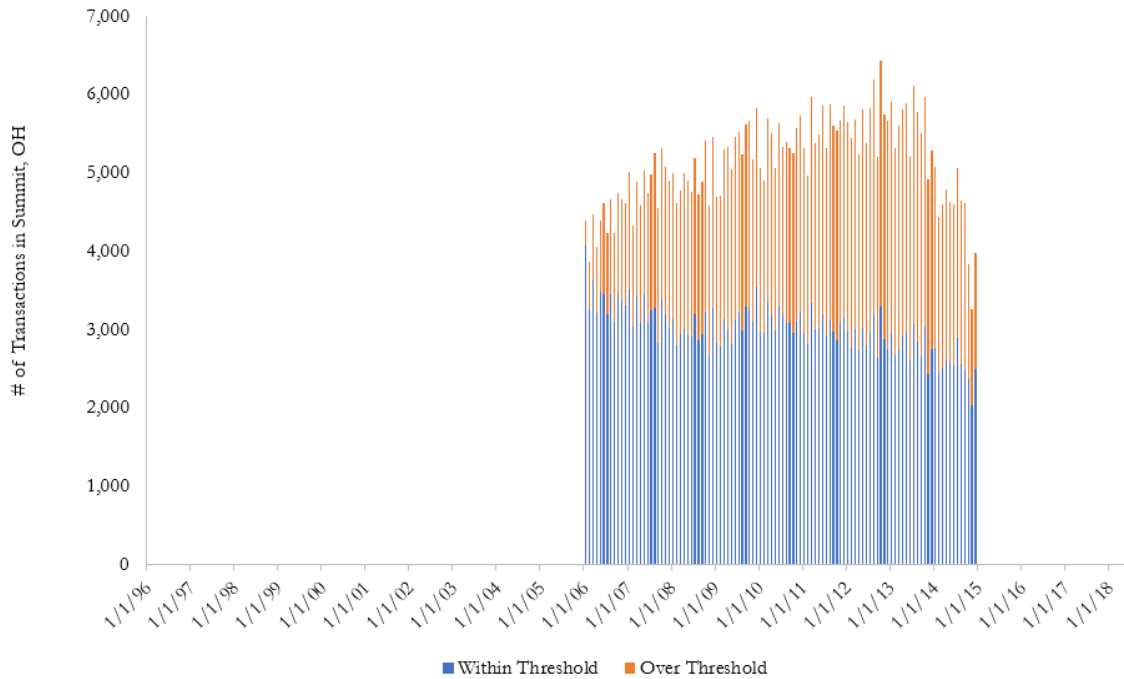
62. Figure 8 illustrates total opioid transactions into Cuyahoga County from ARCOS Data for 2006 to 2014 I attribute to a Manufacturer Defendant and the transactions flagged under the Maximum 8,000 Dosage Units Monthly Threshold methodology. This methodology flags 31.6% of transactions accounting for 50.0% of dosage units, 33.7% of MME and 31.7% of drug weight shipped into Cuyahoga County.

Figure 8 Maximum 8,000 Dosage Units Monthly Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014



63. Figure 9 illustrates total opioid transactions into Summit County from ARCOS Data for 2006 to 2014 I attribute to a Manufacturer Defendant and the transactions flagged by the Maximum 8,000 Dosage Units Monthly Threshold methodology. This methodology flags 41.4% of transactions accounting for 64.6% of dosage units, 43.0% of MME and 46.5% of drug weight shipped into Summit County.

Figure 9 Maximum 8,000 Dosage Units Monthly Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014



64. Table 18 and Table 19 summarize the transactions flagged based on the Maximum 8,000 Dosage Units Monthly Threshold Approach in Cuyahoga and Summit Counties.

Table 18 Maximum 8,000 Dosage Units Monthly Threshold Flagged Transactions
Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	44,129	67,681	0	0	0	0	111,810	41.9%
Allergan	42,393	67,479	0	0	0	0	109,872	42.0%
Cephalon	n/a	n/a	n/a	n/a	n/a	0	0	0.0%
Endo	1,927	0	0	n/a	0	n/a	1,927	4.1%
Janssen	0	n/a	n/a	n/a	n/a	0	0	0.0%
Mallinckrodt	42,494	71,864	362	0	0	0	114,720	40.7%
Par	5,994	25,850	0	0	0	0	31,844	22.3%
Purdue	7,318	n/a	0	0	n/a	n/a	7,318	7.4%
Qualitest	7,502	25,671	0	0	0	0	33,173	24.4%
Teva	46,755	73,214	0	0	0	0	119,969	38.7%

Table 19 Maximum 8,000 Dosage Units Monthly Threshold Flagged Transactions
Attributed to Manufacturer Defendants, Summit County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	23,901	56,136	594	0	0	0	80,631	52.1%
Allergan	22,945	56,112	547	0	0	0	79,604	52.2%
Cephalon	n/a	n/a	n/a	n/a	n/a	0	0	0.0%
Endo	6,770	0	81	n/a	2,152	n/a	9,003	20.3%
Janssen	0	n/a	n/a	n/a	n/a	0	0	0.0%
Mallinckrodt	34,123	58,730	1,855	1,400	0	0	96,108	49.3%
Par	10,289	27,733	86	0	0	1	38,109	39.4%
Purdue	4,972	n/a	942	0	n/a	n/a	5,914	10.7%
Qualitest	11,284	27,333	81	3	0	1	38,702	41.0%
Teva	24,593	58,466	104	0	1,182	0	84,345	48.5%

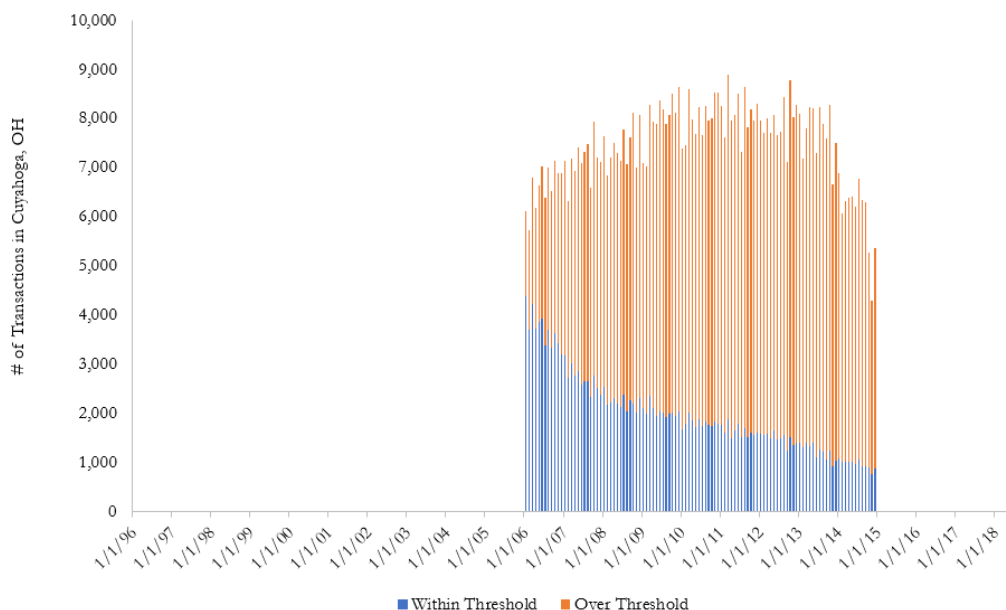
E. Maximum Daily Dosage Units

65. I identify transactions that cause the number of dosage units to a Pharmacy in a day attributable to a Manufacturer Defendant to exceed a

number of dosage units that varies by drug type and within some drug types by formulation.¹⁴ I have been asked by Counsel to assume that the Manufacturer did not effectively investigate the flagged transactions and so every subsequent transaction of that drug code is also flagged because the Distributor had an unfulfilled obligation to detect and investigate the first flagged transaction.

66. Figure 10 illustrates total opioid transactions into Cuyahoga County from ARCOS Data for 2006 to 2014 I attribute to a Manufacturer Defendant and the transactions flagged by the Maximum Daily Dosage Units Threshold methodology. This methodology flags 73.4% of transactions accounting for 86.6% of dosage units, 81.7% of MME and 75.9% of drug weight shipped into Cuyahoga County.

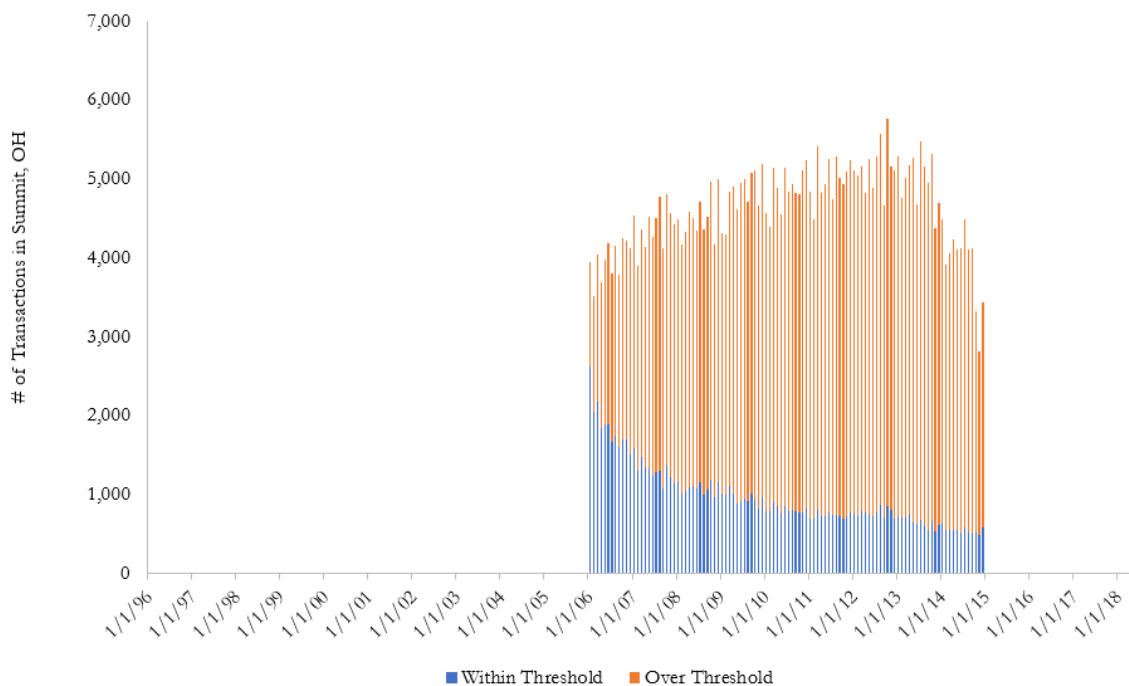
Figure 10 Maximum Daily Dosage Units Flagged Transactions Attributed to Manufacturer Defendants, Cuyahoga County, 2006-2014



¹⁴ Maximum Daily Dosage Units used as specified in CAH_MDLPRIORPRO_DEA07_01384160

67. Figure 11 illustrates total opioid transactions into Summit County from ARCOS Data for 2006 to 2014. I attribute to a Manufacturer Defendant and the transactions flagged by the Maximum Daily Dosage Units Threshold methodology. This methodology flags 79.0% of transactions accounting for 90.7% of dosage units, 87.7% of MME and 82.7% of drug weight shipped into Summit County.

Figure 11 Maximum Daily Dosage Units Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014



68. Table 20 and Table 21 summarize the transactions flagged based on the Maximum Daily Dosage Units Threshold Approach in Cuyahoga and Summit Counties.

Table 20 Maximum Daily Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants in Cuyahoga County, 2006-2014

# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	61,603	117,765	8,416	0	n/a	164	187,948	77.2%
Allergan	59,724	117,129	7,848	0	n/a	144	184,845	77.6%
Cephalon	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Endo	8,997	0	773	n/a	n/a	n/a	9,770	28.0%
Janssen	0	n/a	n/a	n/a	n/a	3	3	0.1%
Mallinckrodt	75,661	133,005	7,029	6,532	n/a	1,238	223,465	80.2%
Par	20,263	65,073	818	0	n/a	4,083	90,237	65.9%
Purdue	57,155	n/a	9,532	222	n/a	n/a	66,909	68.0%
Qualitest	23,266	63,917	1,040	12	n/a	4,083	92,318	68.1%
Teva	66,406	122,867	4,891	0	n/a	12,943	207,107	74.0%

Table 21 Maximum Daily Dosage Units Threshold Flagged Transactions Attributed to Manufacturer Defendants, Summit County, 2006-2014

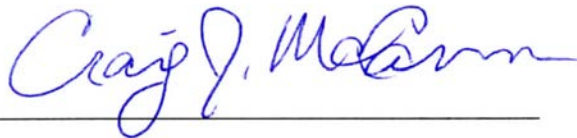
# of Flagged Transactions	Oxycodone	Hydrocodone	Morphine	Hydromorphone	Oxymorphone	Other	Total Flagged Transactions	Percentage of Total Transactions
Actavis	34,570	74,102	8,041	4	n/a	35	116,752	82.5%
Allergan	33,716	73,917	7,336	0	n/a	25	114,994	82.7%
Cephalon	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Endo	12,664	0	3,447	n/a	n/a	n/a	16,111	51.7%
Janssen	0	n/a	n/a	n/a	n/a	0	0	0.0%
Mallinckrodt	58,799	81,387	9,243	10,759	n/a	512	160,700	84.5%
Par	19,964	42,549	3,598	9	n/a	417	66,537	71.8%
Purdue	34,015	n/a	8,445	234	n/a	n/a	42,694	77.5%
Qualitest	21,735	41,143	4,164	220	n/a	417	67,679	71.9%
Teva	38,503	76,586	4,155	0	n/a	2,560	121,804	79.3%

VI. Conclusion

69. In this supplement to McCann Report, I explained how the ARCOS data, NDC numbers and chargeback data can be used to attribute a transaction with a Dispenser in Cuyahoga County and Summit County to a Manufacturer Defendant.

70. I reported the results of applying the non-exhaustive set of algorithms in the McCann Report for flagging transactions to the transactions attributable to Manufacturer Defendants.

71. I continue to review documents and gather information and reserve the right to update my analysis and opinions based upon that further review of documents and based on any new information - including possibly reports of other experts - I may receive.



Craig J. McCann, Ph.D., CFA

Appendix 1 Labelers, Cuyahoga County and Summit County, ARCOS Data, 2006-2014

Rank	Labeler Name	MME	Perecent	Cumulative
1	SpecGx LLC	2,363,328,618	24.84%	24.84%
2	Actavis Pharma, Inc.	1,738,415,745	18.27%	43.11%
3	Purdue Pharma LP	1,243,413,759	13.07%	56.18%
4	Mylan Pharmaceuticals, Inc.	812,560,597	8.54%	64.71%
5	Par Pharmaceutical	801,417,396	8.42%	73.14%
6	Sandoz Inc	326,803,360	3.43%	76.57%
7	Teva Pharmaceuticals USA, Inc.	275,018,491	2.89%	79.46%
8	Janssen Pharmaceuticals, Inc.	261,918,787	2.75%	82.21%
9	Endo Pharmaceuticals, Inc.	256,614,381	2.70%	84.91%
10	Hospira, Inc.	218,988,687	2.30%	87.21%
11	West-Ward Pharmaceuticals Corp.	209,187,024	2.20%	89.41%
12	Rhodes Pharmaceuticals	135,748,211	1.43%	90.84%
13	Amneal Pharmaceuticals LLC	126,395,133	1.33%	92.17%
14	KVK-Tech, Inc.	114,646,567	1.20%	93.37%
15	Ethex Corporation	109,507,886	1.15%	94.52%
16	Baxter Healthcare Corporation	65,057,223	0.68%	95.21%
17	Apotex Corp.	60,850,950	0.64%	95.85%
18	Alpharma Pharmaceuticals LLC	36,899,587	0.39%	96.23%
19	Sun Pharmaceutical Industries, Inc.	32,290,942	0.34%	96.57%
20	Cephalon, Inc.	32,166,783	0.34%	96.91%
21	Pfizer Laboratories Div Pfizer Inc	31,433,363	0.33%	97.24%
22	AbbVie Inc.	29,992,813	0.32%	97.56%
23	Lannett Company, Inc.	23,744,209	0.25%	97.81%
24	Alvogen, Inc.	21,832,352	0.23%	98.04%
25	American Health Packaging	14,438,252	0.15%	98.19%
26	Xanodyne Pharmaceuticals, Inc.	13,843,749	0.15%	98.33%
27	Akorn, Inc.	12,771,681	0.13%	98.47%
28	Zydus Pharmaceuticals (USA) Inc.	12,747,558	0.13%	98.60%
29	Glenmark Pharmaceuticals Inc., USA	12,141,504	0.13%	98.73%
30	Morton Grove Pharmaceuticals, Inc.	11,113,846	0.12%	98.85%
31	Impax Generics	10,886,564	0.11%	98.96%
32	Fagron Inc	10,088,767	0.11%	99.07%
33	VistaPharm Inc.	9,818,787	0.10%	99.17%
34	Upsher-Smith Laboratories, LLC	8,142,888	0.09%	99.25%
35	Ligand Pharmaceuticals, Inc.	7,959,168	0.08%	99.34%
36	CIMA Labs Inc.	7,078,596	0.07%	99.41%
37	Unither Manufacturing LLC	6,854,058	0.07%	99.48%

Rank	Labeler Name	MME	Perecent	Cumulative
38	Aurolife Pharma LLC	6,437,047	0.07%	99.55%
39	Paddock Laboratories, LLC.	5,556,511	0.06%	99.61%
40	Hi-Tech Pharmacal Co., Inc.	3,693,668	0.04%	99.65%
41	McKesson Corporation	3,207,386	0.03%	99.68%
42	Nexcyon Pharmaceuticals, Inc.	2,250,000	0.02%	99.71%
43	CorePharma, LLC	1,871,710	0.02%	99.73%
44	Ortho McNeil Pharmaceuticals	1,624,081	0.02%	99.74%
45	Sanofi-Aventis U.S. LLC	1,563,261	0.02%	99.76%
46	Medisca Inc.	1,558,777	0.02%	99.78%
47	AAI Pharma	1,506,313	0.02%	99.79%
48	Letco Medical, LLC	1,307,447	0.01%	99.81%
49	Kremers Urban Pharmaceuticals Inc.	1,214,966	0.01%	99.82%
50	Pharmaceutical Associates, Inc.	1,171,573	0.01%	99.83%
51	Marathon Pharmaceuticals, LLC	1,072,928	0.01%	99.84%
52	Lehigh Valley Technologies, Inc.	970,619	0.01%	99.85%
53	Mylan Institutional Inc.	951,902	0.01%	99.86%
54	Major Pharmaceuticals	923,840	0.01%	99.87%
55	Dispensing Solutions Inc.	918,573	0.01%	99.88%
56	Almac Clinical Services LLC	809,918	0.01%	99.89%
57	Mayne Pharma Inc.	806,431	0.01%	99.90%
58	Lake Erie Medical DBA: Quality Care Products LLC	702,265	0.01%	99.91%
59	ANI Pharmaceuticals, Inc	702,100	0.01%	99.91%
60	Victory Pharma, Inc.	642,349	0.01%	99.92%
61	Hawthorn Pharmaceuticals, Inc.	621,135	0.01%	99.93%
62	Lupin Pharmaceuticals, Inc.	613,119	0.01%	99.93%
63	UCB, Inc.	601,249	0.01%	99.94%
64	Amerifit, Inc.	595,800	0.01%	99.95%
65	n/a	484,286	0.01%	99.95%
66	Forest Laboratories, Inc.	424,839	0.00%	99.96%
67	Edenbridge Pharmaceuticals, LLC	422,480	0.00%	99.96%
68	TAGI Pharma, Inc.	411,885	0.00%	99.96%
69	Insys Therapeutics, Inc.	405,990	0.00%	99.97%
70	Amphastar Pharmaceuticals, Inc.	402,436	0.00%	99.97%
71	PD-Rx Pharmaceuticals, Inc.	252,108	0.00%	99.98%
72	Allergan, Inc.	223,229	0.00%	99.98%
73	Eon Labs, Inc.	221,364	0.00%	99.98%
74	Alfasigma USA, Inc	183,667	0.00%	99.98%
75	Professional Compounding Centers of America DBA PCCA	151,304	0.00%	99.98%
76	Athlon Pharmaceuticals, Inc.	133,274	0.00%	99.98%
77	AvPAK	122,896	0.00%	99.99%

Rank	Labeler Name	MME	Perecent	Cumulative
78	Rebel Distributors Corp.	112,092	0.00%	99.99%
79	Exeltis USA, Inc.	87,934	0.00%	99.99%
80	Taylor Pharmaceuticals	75,500	0.00%	99.99%
81	Brighton Pharmaceuticals, Inc.	75,070	0.00%	99.99%
82	Zogenix, Inc.	72,951	0.00%	99.99%
83	Teammm Pharmaceuticals, Inc.	70,967	0.00%	99.99%
84	Poly Pharmaceuticals, Inc.	64,458	0.00%	99.99%
85	International Medication Systems, Ltd.	60,686	0.00%	99.99%
86	RemedyRepack	54,911	0.00%	99.99%
87	ECR Pharmaceuticals Co., Inc.	54,666	0.00%	99.99%
88	Epic Pharma, LLC	54,033	0.00%	99.99%
89	WraSer Pharmaceuticals	51,071	0.00%	99.99%
90	Shionogi Inc.	43,130	0.00%	100.00%
91	Breckenridge Pharmaceutical, Inc.	42,764	0.00%	100.00%
92	Fresenius Kabi USA, LLC	42,541	0.00%	100.00%
93	Cypress Pharmaceutical, Inc.	39,997	0.00%	100.00%
94	AstraZeneca Pharmaceuticals LP	35,911	0.00%	100.00%
95	Varsity Laboratories	34,519	0.00%	100.00%
96	G&W Laboratories, Inc.	27,071	0.00%	100.00%
97	Akrimax Pharmaceuticals, LLC	24,138	0.00%	100.00%
98	A-S Medication Solutions	22,534	0.00%	100.00%
99	MAGNA Pharmaceuticals, Inc.	18,911	0.00%	100.00%
100	Gemini Laboratories, LLC	15,589	0.00%	100.00%
101	Spectrum Chemical and Laboratory Products	11,833	0.00%	100.00%
102	Rising Pharmaceuticals, Inc.	11,669	0.00%	100.00%
103	Centrix Pharmaceutical, Inc.	11,503	0.00%	100.00%
104	Avadel Pharmaceuticals (USA), Inc.	11,458	0.00%	100.00%
105	Kyowa Kirin, Inc	10,400	0.00%	100.00%
106	Cardinal Health	8,202	0.00%	100.00%
107	Vision Pharma, LLC	6,875	0.00%	100.00%
108	Talec Pharma, LLC	6,589	0.00%	100.00%
109	Pernix Therapeutics, LLC	6,445	0.00%	100.00%
110	Atley Pharmaceuticals, Inc.	6,380	0.00%	100.00%
111	Kowa Pharmaceuticals America, Inc.	5,751	0.00%	100.00%
112	Precision Dose Inc.	5,640	0.00%	100.00%
113	BF Ascher and Co Inc	4,870	0.00%	100.00%
114	Sigma-Aldrich Corporation	4,775	0.00%	100.00%
115	Archimedes Pharma	4,464	0.00%	100.00%
116	STAT Rx USA LLC	4,086	0.00%	100.00%
117	Avadel Legacy Pharmaceuticals, LLC	3,885	0.00%	100.00%

Rank	Labeler Name	MME	Perecent	Cumulative
118	Watson Pharma, Inc.	2,389	0.00%	100.00%
119	Tris Pharma Inc	2,270	0.00%	100.00%
120	Larken Laboratories, Inc	2,206	0.00%	100.00%
121	Alphagen Laboratories, Inc.	2,005	0.00%	100.00%
122	United Research Laboratories, Inc.	1,591	0.00%	100.00%
123	e5 Pharma, LLC	1,469	0.00%	100.00%
124	Auriga Pharmaceuticals, LLC	1,211	0.00%	100.00%
125	Blansett Pharmacal Co., Inc	1,138	0.00%	100.00%
126	Pacira Pharmaceuticals, Inc.	1,128	0.00%	100.00%
127	B&B Pharmaceuticals, Inc.	1,105	0.00%	100.00%
128	Valeant Pharmaceuticals North America LLC	969	0.00%	100.00%
129	Meda Pharmaceuticals Inc.	884	0.00%	100.00%
130	EKR Therapeutics, Inc.	714	0.00%	100.00%
131	Altura Pharmaceuticals, Inc.	363	0.00%	100.00%
132	Fougera Pharmaceuticals Inc.	332	0.00%	100.00%
133	Prasco Laboratories	315	0.00%	100.00%
134	Bristol-Myers Squibb Holding Pharma, LLC	303	0.00%	100.00%
135	River's Edge Pharmaceuticals, LLC	258	0.00%	100.00%
136	MCR American Pharmaceuticals, Inc.	221	0.00%	100.00%
137	Gentex Pharma, Llc	143	0.00%	100.00%
138	JayMac Pharmaceuticals LLC	118	0.00%	100.00%
139	Laser Pharmaceuticals, LLC	118	0.00%	100.00%
140	Stewart-Jackson Pharmacal, Inc.	91	0.00%	100.00%
Total		9,515,180,612	100%	

Appendix 2 Chargeback Data

1. InSys Therapeutics
 - a. INSYS-MDL-015002410
2. Janssen
 - a. JAN-MS-02963355
 - b. JAN-MS-02963411
 - c. JAN-MS_03108830
 - d. JAN-MS_05433886
 - e. JAN-MS_05433889
3. Mallinckrodt
 - a. MNK-T1_0007965587
 - b. MNK-T1_0007965588
4. Endo Pharmaceuticals
 - a. ENDO_DATA-OPIOID_MDL-00000044 through
ENDO_DATA-OPIOID_MDL-00000084
5. Par Pharmaceuticals
 - a. PAR_OPIOID_MDL_0001596821 through
PAR_OPIOID_MDL_0001596826
6. Qualitest
 - a. PAR_OPIOID_MDL_0002016639 through
PAR_OPIOID_MDL_0002016786

7. Purdue
 - a. PPLP004418578 through PPLP004422150
8. Actavis
 - a. Acquired_Actavis_01996162 through
Acquired_Actavis_01996173
 - b. Acquired_Actavis_02001331
 - c. Acquired_Actavis_02001522
9. Allergan
 - a. ALLERGAN_MDL_03255576_0001 through
ALLERGAN_MDL_03255576_0010
 - b. ALLERGAN_MDL_03303052_001 through
ALLERGAN_MDL_03303052_003
 - c. ALLERGAN_MDL_03303053_001 through
ALLERGAN_MDL_03303053_050
 - d. ALLERGAN_MDL_03729472
 - e. ALLERGAN_MDL_03729468
 - f. ALLERGAN_MDL_03729469
 - g. ALLERGAN_MDL_03732865
10. Teva
 - a. TEVA_MDL_A_02401118
 - b. TEVA_MDL_A_02416193
 - c. TEVA_MDL_A_02419960

- d. TEVA_MDL_A_02419963
- e. TEVA_MDL_A_02416194 through
TEVA_MDL_A_02416204
- f. TEVA_MDL_A_02419961
- g. TEVA_MDL_A_02419964 through
TEVA_MDL_A_02419969
- h. TEVA_MDL_A_07869902
- i. TEVA_MDL_A_07876854
- j. TEVA_MDL_A_07880643
- k. TEVA_MDL_A_07885150
- l. TEVA_MDL_A_07889185
- m. TEVA_MDL_A_07889289
- n. TEVA_MDL_A_07901020
- o. TEVA_MDL_A_07907289
- p. TEVA_MDL_A_07914958
- q. TEVA_MDL_A_07921677
- r. TEVA_MDL_A_07921926 through
TEVA_MDL_A_07921928
- s. TEVA_MDL_A_07928169
- t. TEVA_MDL_A_08637273 through
TEVA_MDL_A_08637277

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